

Appl. No. : 10/737,315
Filed : December 15, 2003

REMARKS

In the Office Action mailed October 3, 2005, the Examiner rejected all pending claims, Claims 1-31. In the present Amendment and Response to Office Action, Applicants have amended Claims 16, 26 and 29-31. Applicants respectfully request entry of the amendments and full consideration of the remarks contained herein.

Amendments to the Claims

Applicants have amended the claims to further clarify the subject matter that Applicants regard as the invention. For example, Claim 16 has been amended to recite that the metal nitride layer has “a step coverage of greater than about 90%.” Support for this amendment can be found in the Application as originally filed. *See, e.g.*, the Application, p. 27, as originally filed. Claim 26 has also been amended to recite that the “depth to width ratio is about 8:1.” Support for this amendment can be found in the Application as originally filed. *See, e.g.*, the Application, p. 10, as originally filed.

In addition, the dependencies of Claims 29-31 have been amended to correct obvious clerical errors. Claim 29 has been amended to depend from Claim 27, Claim 30 has been amended to depend from Claim 1 and Claim 31 has been amended to depend from Claim 30. As these amendments simply correct obvious clerical errors and amend the claims to depend from other claims containing antecedent basis support for various claim terms, Applicants submit that support for these amendments can be found in the Application as originally filed.

Applicants respectfully submit that the amendments add no new matter and are fully supported by the application as originally filed.

Rejections Under 35 U.S.C. § 112

The Examiner has rejected Claims 29-31 as being indefinite for being self-referential with respect to recited claim dependencies or for reciting dependency from themselves or from claims without antecedent support for claim terms. In response, Applicants have amended the dependencies of Claims 29-31, as noted above. Claim 29 now depends from Claim 28, which provides antecedent basis support for terms in Claim 29. In addition, Claim 30 now depends from Claim 1 and Claim 31 now depends from Claim 30. Consequently, Applicants submit that the rejections under 35 U.S.C. § 112 are overcome.

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Rejections Under 35 U.S.C. § 102

The Examiner has rejected Claims 1-4, 6-11 and 27-29 as being anticipated by Gates *et al.* (U.S. Patent No. 6,203,613). The Examiner has also rejected Claims 16-17, 19-20, 22 and 24 as being anticipated by Liu *et al.* (U.S. Patent No. 6,037,258).

Applicants respectfully traverse the rejections and submit that the claims, as amended herewith, are patentably distinct.

Regarding Gates *et al.*, Applicants note that Gates *et al.* is not available as prior art against the present Application. The present Application and the pending rejected claims deserve a priority date of at least October 15, 1999, while Gates *et al.* has a filing date of October 19, 1999. As a result, Applicants submit that Gates *et al.* does not qualify as prior art against the present Application. Consequently, Applicants submit that the rejections of Claims 1-4, 6-11 and 27-29 for anticipation in view of Gates *et al.* are moot.

Regarding Liu *et al.*, Applicants note that independent Claim 16 has been amended to recite a “metal nitride layer having a maximum thickness of no more than about 200 Å on any surface and *a step coverage of greater than about 90%*.” (emphasis added). Liu *et al.* does not discuss and, so, does not teach, a metal nitride layer with such a high step coverage. As a result, Applicants submit that the rejections of independent Claim 16 and dependent Claims 17, 19-20, 22 and 24 are moot.

Rejection Under 35 U.S.C. § 103

The Examiner has rejected Claims 12-15 as being unpatentable over Gates *et al.* in combination with Zhao *et al.* (U.S. Patent No. 6,627,539). Gates *et al.* is asserted for teaching the general features of independent Claim 1 and Zhao *et al.* is asserted for teaching the additional features of Claims 12-15. The Examiner has also rejected Claims 18, 21, 23 and 25-26 as being unpatentable over Liu *et al.* in view of various other references. Liu *et al.* is asserted for teaching the general features of independent Claim 16 and the various other references are asserted for teaching the additional features of Claims 18, 21, 23 and 25-26.

Applicants respectfully traverse the rejections.

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Regarding Claims 12-15, Applicants note, as discussed above, that Gates *et al.* is not available as prior art against the present Application. Consequently, Applicants submit that the rejection of Claims 12-15 in view of the combination of Gates *et al.* and Zhao *et al.* is moot.

Regarding Claims 18, 21, 23 and 25-26, Applicants note, as discussed above, that independent Claim 16, from which Claims 18, 21, 23 and 25-26 depend, has been amended to recite a “metal nitride layer having a maximum thickness of no more than about 200 Å on any surface and *a step coverage of greater than about 90%.*” (emphasis added). In view of the amendment to Claim 16, Applicants submit that the rejections of Claims 18, 21, 23 and 25-26 are moot.

Moreover, as also discussed above, Applicants submit that Liu *et al.* does not teach the recited thickness in combination with the recited step coverage. Applicants submit that the art of record also does not satisfy this deficiency. Consequently, Applicants submit that the combination of Liu *et al.* with the art of records does not teach a “metal nitride layer having a maximum thickness of no more than about 200 Å on any surface and a step coverage of greater than about 90%,” as recited by Claim 16. As such, Applicants submit that Claims 18, 21, 23 and 25-26, depending from Claim 16, are not obvious in view of the art of record.

For completeness, Applicants note that even the use of atomic layer deposition (ALD), such as discussed in Gates *et al.*, may not form highly uniform layers having high step coverage in all contexts. For example, Applicants have recognized that the very precursors used in ALD can adversely affect uniformity in dual damascene processing by corroding exposed metal surfaces, thereby decreasing the uniformity of the overlying layers formed by ALD. *See, e.g.*, the Application, pg. 24. Applicants have advantageously devised a process which can minimize corrosion of exposed metal surfaces and which does form the recited very uniform ALD layers in a dual damascene context, including over exposed metal surfaces that would otherwise be sensitive to corrosion by ALD precursors.

Accordingly, Applicants submit that the pending claims are allowable over the art of record. Applicants have not addressed the rejections of all dependent claims as being moot in view of the amendments and remarks herein. However, Applicants expressly do not acquiesce in the Examiner’s findings not addressed herein. Indeed, Applicants submit that the dependent claims not addressed herein recite further novel and non-obvious features of particular utility.

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CONCLUSIONS

In view of the foregoing amendments and remarks, Applicants request entry of the amendments and submit that the application is in condition for allowance and respectfully request the same. If some issue remains which the Examiner feels may be addressed by Examiner's amendment, the Examiner is cordially invited to call the undersigned for authorization.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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